Dual-phase steel

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Dual-phase steel (**DPA**) is a high-strength steel that has a ferrite and martensitic microstructure. DPA starts as a low or medium carbon steel and is quenched from a temperature above A_1 but below A_3 on a continuous cooling transformation diagram. This results in a microstructure consisting of a soft ferrite matrix containing islands of martensite as the secondary phase (martensite increases the tensile strength). The desire to produce high strength steels with formability greater than microalloyed steel led the development of DPS in 1970s.[1][2]

The steel melt is produced in an oxygen top blowing process in the converter, and undergoes an alloy treatment in the secondary metallurgy phase. The product is aluminum-killed steel, with high tensile strength achieved by the composition with manganese, chromium and silicon.

Their advantages are as follows:[1][3]

- Low yield strength
- Low yield to tensile strength ratio (yield strength / tensile strength = 0.5)
- High initial strain hardening rates
- Good uniform elongation
- A high strain rate sensitivity (the faster it is crushed the more energy it absorbs)[2]
- Good fatigue resistance

Due to these properties DPS is often used for automotive body panels, wheels, and bumpers.[3]

Contents

See also

- Dual Phase Steels Magnetism Modeling

References

Notes

1. ^ *a* *b* Chakraborti & Mitra 2007.
2. ^ *a* *b* Degarmo, Black & Kohser 2003, p. 117.
3. ^ *a* *b* Fallahi 2002.

Bibliography

- Chakraborti, P.C.; Mitra, M.K. (2007-10-27), "Microstructure and tensile properties of high strength duplex ferrite-martensite (DFM) steels", *Materials science & engineering* **466** (1–2): 123–133, doi:10.1016/j.msea.2007.02.042.

- Degarmo, E. Paul; Black, J T.; Kohser, Ronald A. (2003), *Materials and Processes in Manufacturing* (9th ed.), Wiley, ISBN 0-471-65653-4.
- Fallahi, A. (2002), "Microstructure-Properties Correlation of Dual Phase Steels Produced by Controlled Rolling Process" (), *Journal of material science & technology* **18** (5): 451–454, ISSN 1005-0302, http://www.jmst.org/pcn/qikan/manage/wenzhang/02451.pdf.

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